Q. Solve the following Transportation problem.

	m_1	m_2	m_3	m_4	capacity
F_1	6	1	9	3	70
F_2	11	5	2	8	55
F_3	10	12	4	7	70
Requirement	85	35	50	45 $\leftarrow$ 215 $\overset{\downarrow}{195}$	

Sol: Σ capacity $\neq$ Σ Requirement

Add a dummy row.

	m_1	m_2	m_3	m_4	capacity	Penalty				
F_1	[65]6	[5]1	9	3	~~70~~ 5	2	2	2		
F_2	11	[30]5	[25]2	8	~~55~~25 3	3	3	3	6 $\leftarrow$	
F_3	10	12	[25]4	[45]7	~~70~~45 3	3	3	3	3	
F_4	[20]0	0	0	0	20	0				
Requirement	8̶5̶	3̶5̶	5̶0̶	45	215					
	6̶5̶	30	25	3						
	6	1	2							
	4	4	2	4						
	$\uparrow$	4	2	4						
		7	2	1						
			2	1						

$$\text{cost} = (65 \times 6) + (5 \times 1) + (30 \times 5) + (25 \times 2) + (25 \times 4) + (45 \times 7) +$$
$$(20 \times 0) = 390 + 5 + 50 + 50 + 100 + 315 + 0$$
$$= \underline{\underline{1010}}.$$

Optimality list = $(1,1)$, $(1,2)$, $(2,2)$, $(2,3)$, $(3,3)$, $(3,4)$, $(4,1)$

cost in the cells are $6, 1, 5, 2, 4, 7, 0$.

$u_1 + v_1 = 6$

$u_1 + v_2 = 1$

$u_2 + v_2 = 5$

$u_2 + v_3 = 2$

$u_3 + v_3 = 4$

$u_4 + v_1 = 0$

65	6	5	1 +		9		3
	11	30	9 −	25	2 +		8
+ 10			12	25	4 −	45	7
20	0		0		0		0

60	6	10	1		9		3
	11	25	5	30	2		8
	10		12	20	4	45	7
20	0		0		0		0

total cost = $(60 \times 6) + (10 \times 1) + (25 \times 5) + (30 \times 2) + (5 \times 10) + (20 \times 4) +$
$(45 \times 7) + (20 \times 0)$

= 360 + 10 + 125 + 60 * 50 + 80 + 315 + 0

= 1000